

# Vitamin D Levels in Type II Diabetic Patients

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## ABSTRACT

**Objective:** To determine the frequency of vitamin D deficiency in type-II diabetes at Chandka Medical College, Hospital Larkana.

**Study Design:** Cross-sectional study.

**Place and Duration of Study:** This study was conducted at the Department of Medicine, Medical Unit-2, Chandka Medical College Hospital, SMBBMU, Larkana from July to December 2018.

**Materials and Methods:** A total of 355 patients with type 2 diabetes mellitus were included in this study. Basic demographics were recorded. Blood samples were taken from the patients for assessment of vitamin D levels and were sent to laboratory.

**Results:** The average age of the patients was  $44.66 \pm 10.85$  years. There were 196(55.21%) male and 159(44.79%) female. The vitamin D deficiency in type-II diabetic patients was observed in 175 (49.3%).

**Conclusion:** This study revealed that vitamin D deficiency was high in patients with type 2 diabetes mellitus. It is advisable that supplementation of vitamin D in deficient type 2 diabetes mellitus patients may give better glycemic control.

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**Key Words:** Type 2 diabetes mellitus, Vitamin D deficiency, Glycaemic control.

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## INTRODUCTION

The increasing prevalence of type 2 diabetes mellitus is taking a great toll of health resources. This has laid a number of research studies related to factors in an attempt to ameliorate its burden. Worldwide incidence of diabetes has risen from 108 million in 1980 to 442 million in 2014 with nearly 6 million Americans suffer from type 2 diabetes.<sup>1</sup>

Vitamin D deficiency is associated with type II diabetes, elevated lipids, cardiovascular disease and hypertension.<sup>2-7</sup> A very few studies unable to describe any improvement in glycemic control or indices of insulin sensitivity during vitamin D supplementation.<sup>8-11</sup> CVD cardiovascular disease is the major contributor to mortality in diabetic population.<sup>12</sup>

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At the same time, there's evidence that Vitamin D increase insulin sensitivity. Moreover, a data from a pilot study examining vitamin D deficiency in diabetic patients of two groups in 2006 showed 63% of T2DM patients has vitamin D deficiency.<sup>13</sup> Bayani reported that vitamin D deficiency was observed in 64% according to Caspian journal of internal Medicine in T2DM patients.<sup>14</sup> Diabetes Mellitus is an established risk factor for coronary artery disease where the enhanced pro-inflammatory and prothrombotic status could render even more important than the athero-protective effects of Vitamin D. This will help in risk stratification and ultimately pave the way for early correction of deficiencies and prevention of CVD morbidity and mortality in diabetic patients.

Furthermore by knowing the vitamin D level we can also depict the significant health disparities among our population with the rest of the world despite abundant sunshine. This study aimed to determine the frequency of vitamin D deficiency in type-II diabetic patients.

## MATERIALS AND METHODS

A cross-sectional study was done in statistically calculated sample (n=355) at department of medicine, medical unit-2 Chandka Medical College Hospital SMBBMU, Larkana from July to December 2018. Patients were enrolled who fulfilled the inclusion criteria (age 18 to 65 years of both genders having type

2 diabetes mellitus with duration of 10 or more years). Patients had chronic renal failure, liver cirrhosis, malabsorption syndrome i-e celiac disease, sprue, cystic fibrosis & IBD, taking steroids or vitamin D supplements and insulin resistance disease were excluded. Written informed consent obtained from all the patients after explanation of study protocol. Basic demographics were recorded i-e smoking, patient's height, weight and BMI.

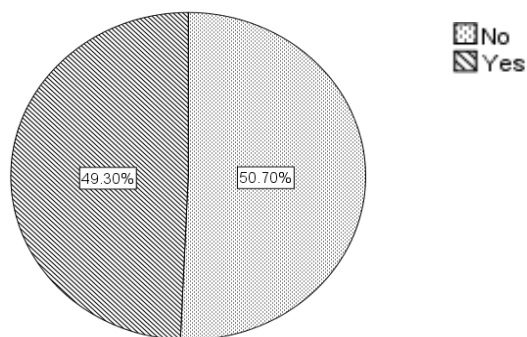
Blood samples were taken from the patients for assessment of vitamin D levels and was sent to laboratory for reports. The test was done free of cost and the results were classified normal (vitamin D level  $\geq 30$ ng/ml), deficient (vitamin D level  $< 30$ ng/ml).

Data was analyzed using SPSS software version 21. Description statistics like frequencies and percentages calculated for gender, smoking, obesity (BMI $>27.5$ ) and vitamin d levels. Mean  $\pm$  SD (standard deviation) calculated for age, weight, height, BMI. Stratification was done with regards to age, gender, smoking, and obesity and duration of DM to see the effect of these on outcome by applying chi-square test with P value  $< 0.05$  as significant.

**RESULTS**

**Table No.1: Study Characteristics of Patients**

Variables	Mean	Std. Deviation	95% Confidence Interval for Mean	
			Lower Bound	Upper Bound
Age (Years)	44.66	10.85	43.53	45.79
Duration of DM	13.93	2.47	13.67	14.19
Weight (kg)	71.39	15.98	69.72	73.06
Height (cm)	161.21	9.33	160.24	162.19
BMI (kg/m <sup>2</sup> )	27.45	5.70	26.8	28.05
Vitamin D level	30.16	7.26	29.4	30.92



**Figure No.1: Vitamin D Deficiency in T2DM patients (n=355)**

The mean age of 355 patients was  $44.66 \pm 10.85$  years and mean duration of diabetes was  $13.93 \pm 2.47$  years. There were 196(55.21%) males and 159(44.79%) females. Out of 355, 92 (25.92%) were obese, 118(32.24%) smokers, 155 (43.7%) rural and 200 (56.3%) were urban patients. (Table-1).

Vitamin D deficiency in type-II diabetes was observed in 175 (49.3%). (Figure-1). The vitamin d deficiency was not found significantly associated with any of the study variables. (Table-2).

**Table No.2: Status of Vitamin D Deficiency in Study Variables**

	Vitamin D Deficiency		P-Value
	Yes	No	
<b>Age Groups (yrs)</b>			0.097
$\leq 30$	18(50%)	18(50%)	
31- 40	54(45%)	66(55%)	
41- 50	56(62.9%)	33(37.1%)	
51- 60	32(46.4%)	37(53.6%)	
$> 60$	15(36.5%)	26(63.4%)	
<b>Gender</b>			0.730
Male	95(48.5%)	101(51.5%)	
Female	80(50.3%)	79(49.7%)	
<b>Smoker</b>			0.276
Yes	63(53.4%)	55(46.6%)	
No	112(47.3%)	125(52.7%)	
<b>Obesity</b>			0.377
Yes	49(53.3%)	43(46.7%)	
No	126(47.9%)	137(52.1%)	
<b>Duration of DM</b>			0.892
$\leq 15$ Years	138(49.1%)	143(50.9%)	
$> 15$ Years	37(50%)	37(50%)	

**DISCUSSION**

Diabetes mellitus is one in all the foremost common chronic sicknesses within the world. Dynamical life designs and dietary habits has accelerated its prevalence. This increase is extremely evident in South Asia wherever it's assumed epidemic proportions. The amount of diabetic patients is anticipated to succeed in 370 million by the year 2030.<sup>15</sup> Each environmental and genetic factors play a job within the development of DM. In most cases the presence of sort two DM is said to some unhealthy style of modus vivendi practices. Such factors will typically be changed. One in all the foremost necessary of those modifiable factors is fat. Vitamin D deficiency is additionally one such different modifiable issue that is being involved within the development and management of diabetes.<sup>16</sup> Studies have shown that Vitamin D deficiency is directly proportional to internal secretion resistance and CVD risk in obese adolescents.<sup>17</sup> Low level of Vitamin D are also seen in metabolic syndrome.<sup>18</sup> Traditional Vitamin D levels are associated with low risk of development of type II DM and low Vitamin D levels are found to be related to the higher risk of developing type II DM.<sup>19</sup> Vitamin D deficiency could be a worldwide

epidemic. consistent with UN agency statistics, around one billion individuals area unit littered with Vitamin D deficiency throughout the planet. Though the most supply of Vitamin D is daylight, in most of the people, vitamin d level has been found to be low in countries settled in extremes of the hemispheres and additionally in tropical countries.<sup>20</sup> The male dominance was reportable in different studies. Shera et al, investigated the prevalence of sort two DM within the metropolitan and metropolitan zones of Baluchistan, Pakistan.<sup>21,33</sup> They recruited 1404 males and females. The general prevalence in each urban and rural regions was 13.46% and it absolutely was 14.71% in males and 12.89% in females. Basit et al, 2000 reportable the prevalence of DM from Pakistan.<sup>22,33</sup> They recruited 2032 (670 males and 1362 females) and found the general prevalence of diabetes together with antecedently and freshly diagnosed diabetes was 7.2%, however, the prevalence was 11.9% in males and 4.9% in females.<sup>33</sup>

Vitamin D deficiency has received special attention recently because of its high incidence and its implication within the genesis of multiple chronic sicknesses. The high prevalence of vitamin d deficiency in our study population underlines the very fact that vitamin d deficiency is a lot of common in chronic diseases like DM. Our study showed that vitamin d was inadequate during a massive population of patients with sort two diabetes. In our study the frequency of vitamin d deficiency in type-II diabetes was ascertained in 49.3% and was considerably high in below and equal to fifty years of patients as compare to higher than fifty years of patients. These findings are supported by variety of studies. Shahzad et al, found vitamin d deficiency in 92% patients of diabetes.<sup>23</sup> Iqbal et al, found vitamin d deficiency in 30.6% patients of diabetes with smart management and in 58.7% patients with poor management.<sup>24</sup> Alhumaidi et al, found vitamin d deficiency in 76.6% diabetic patients and in 58.1% non-diabetic patients.<sup>25</sup> Sheth and coworkers, during a case control study among diabetics in Asian nation ascertained vitamin d deficiency in 91.4% and 93.0% of T2DM cases and control subjects respectively.<sup>26,34</sup> During a cross sectional Iranian study by Taheri and colleagues, the prevalence of vitamin d deficiency was 83.3% in diabetic patients and 75.6% in healthy subjects.<sup>27,34</sup> Another cross sectional study among rural and urban adult Indians, Harinarayan et al, additionally ascertained a 44% and 62% for rural and urban men respectively and 70% and 75% deficiency for rural and urban women respectively.<sup>28,34</sup> Age is a very important factor and lower levels of vitamin d has been noted with advancing age.<sup>29,32</sup> On the contrary, we have a tendency to found that vitamin d levels increase with advancing age, and age was found to be an independent predictor for vitamin d levels in our study. Studies in an Iranian population have shown that correlation exists between BMI and vitamin d levels.<sup>30,32</sup> On the contrary, a study by

Lagunova et al, in 2126 subjects with metabolic syndrome or diabetes has established an inverse relation-ship between vitamin d levels and BMI; those with high BMI had lower vitamin d levels.<sup>31,32</sup> No positive correlation between these two variables was noticed in our study to support or negate the aforementioned data. However our findings show that BMI was a confounder that determines vitamin d concentrations in this population.

## CONCLUSION

This study revealed that vitamin D deficiency was high in patients with type 2 diabetes mellitus. It is advisable that supplementation of vitamin D in deficient type 2 diabetes mellitus patients may give better glycemic control.

## AUTHOR'S CONTRIBUTION

Concept & Design of Study:	Bashir Ahmed Shaikh
Drafting:	Aneel Kumar, Zahid Ali Shaikh
Data Analysis:	Javeriya Mariam, Aftab Hussain Shah, Kamlesh Kumar
Revisiting Critically:	Bashir Ahmed Shaikh, Aneel Kumar
Final Approval of version:	Bashir Ahmed Shaikh

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

## REFERENCES

1. Rogacev KS, Ulrich C, Blömer L, Hornof F, Oster K, Ziegelin M, et al. Monocyte heterogeneity in obesity and subclinical atherosclerosis. *Eur Heart J* 2010;31(3):369-76.
2. Pittas AG, Dawson-Hughes B, Li T, Van Dam RM, Willett WC, Manson JE, et al. Vitamin D and calcium intake in relation to type 2 diabetes in women. *Diabet Care* 2006;29(3):650-6.
3. Cigolini M, Iagulli MP, Miconi V, Galiotto M, Lombardi S, Targher G. Serum 25-hydroxyvitamin D3 concentrations and prevalence of cardiovascular disease among type 2 diabetic patients. *Diabet Care* 2006;29(3):722-4.
4. Forman JP, Giovannucci E, Holmes MD. Plasma 25-hydroxy vitamin D levels and risk of incident hypertension. *Hypertension* 2007;49:1063-9.
5. Dobnig H, Pilz S, Scharnagl H. Independent association of low serum 25-hydroxyvitamin d and 1, 25-dihydroxyvitamin d levels with all-cause and cardiovascular mortality. *Arch Int Med* 2008;168:1340-9.
6. Wang TJ, Pencina MJ, Booth SL. Vitamin D deficiency and risk of cardiovascular disease. *Circulation* 2008;117:503-11.
7. Giovannucci E, Liu Y, Hollis BW, Rimm EB. 25-hydroxyvitamin D and risk of myocardial infarction in men: a prospective study. *Arch Int Med* 2008;168:1174-80.

8. Sugden JA, Davies JI, Witham MD, Morris AD, Struthers AD. Vitamin D improves endothelial function in patients with type 2 diabetes mellitus and low vitamin D levels. *Diabet Med* 2008; 25:320–5.
9. Jorde R, Figenschau Y. Supplementation with cholecalciferol does not improve glycaemic control in diabetic subjects with normal serum 25-hydroxy vitamin D levels. *Eur J Nutr* 2009;48:349–54.
10. Pittas AG, Harris SS, Stark PC, Dawson-Hughes B. The effects of calcium and vitamin D supplementation on blood glucose and markers of inflammation in nondiabetic adults. *Diabet Care* 2007;30:980–6.
11. VonHurst PR, Stonehouse W, Coad J. Vitamin D supplementation reduces insulin resistance in South Asian women living in New Zealand who are insulin resistant and vitamin D deficient—a randomised, placebo-controlled trial. *Br J Nutr* 2010;103:549–55.
12. Zittermann A, Schleithoff SS, Koerfer R. Putting cardiovascular disease and vitamin D insufficiency into perspective. *Br J Nutr* 2005;94:483–92.
13. Sheth JJ, Shah A, Sheth FJ, Trivedi S, Lele M, et al. Does vitamin D play a significant role in type 2 diabetes? *BMC Endocr Disord* 2015; 15:5.
14. Bayani MA, Akbari R, Banasaz B, Saeedi F. Status of Vitamin-D in diabetic patients. *Caspian J Int Med* 2014;5(1):40.
15. Wild S, Roglic G, Green A, Sicree R, King H. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047–53.
16. Alhumaidi M, Agha A, Dewish M. Vitamin D deficiency in patients with type-2 diabetes mellitus in southern region of Saudi Arabia. *Maedica* 2013;8(3):231–6.
17. Reis AF, Hauache OM, Velho G. Vitamin D endocrine system and the genetic susceptibility to diabetes, obesity and vascular disease. A review of evidence. *Diabetes Metab* 2005;31(4 Pt 1):318–25.
18. Michos ED. Vitamin D deficiency and the risk of incident Type 2 diabetes. *Future Cardiol* 2009;5(1): 15–8.
19. Pittas AG, Lau J, Hu FB, Dawson-Hughes B. The role of vitamin D and calcium in type 2 diabetes. A systematic review and meta-analysis. *J Clin Endocrinol Metab* 2007;92(6):2017–29.
20. Thuesen B, Husemoen L, Fenger M, Jakobsen J, Schwarz P, Toft U, et al. Determinants of vitamin D status in a general population of Danish adults. *Bone* 2012;50(3):605–10.
21. Shera AS, Rafique G, Khwaja IA, Baqai S, Khan IA, King H. Pakistan National Diabetes Survey prevalence of glucose intolerance and associated factors in North West Frontier Province (NWFP) of Pakistan. *J Pak Med Assoc* 1999;49:206–11.
22. Basit A, Hydrie MZ, Ahmed K, Hakeem R. Prevalence of diabetes, impaired fasting glucose and associated risk factors in a rural area of Baluchistan province according to new ADA criteria. *J Pak Med Assoc* 2002;52:357–60.
23. Shahzad A, Sahto AA, Memon AA. Type 2 Diabetics; Frequency Of Vitamin D Deficiency. *Prof Med J* 2017;24(1):31–5.
24. Iqbal K, Islam N, Mehboobali N, Asghar A, Iqbal MP. Association of vitamin D deficiency with poor glycaemic control in diabetic patients. *J Pak Med Assoc* 2016;66(12):1562–5.
25. Sheth JJ, Shah A, Sheth FJ, Trivedi S, Lele M, Shah N, et al. Does vitamin D play a significant role in type 2 diabetes? *BMC Endocrine Disorders* 2015;15:5.
26. Taheri E, Saedisomeolia A, Djalali M, Qorbani M, MadaniCivi M. The relationship between serum 25-hydroxy vitamin D concentration and obesity in type 2 diabetic patients and healthy subjects. *J Diabet Metabolic Dis* 2012;11(1):16.
27. Harinarayan CV, Ramalakshmi T, Prasad UV, Sudhakar D, Srinivasarao PV, et al. High prevalence of low dietary calcium, high phytate consumption, and vitamin D deficiency in healthy south Indians. *Am J Clin Nutr.* 2007;85(4):1062–7.
28. Scragg R, Sowers MF, Bell C. Serum 25-hydroxyvitamin D, diabetes and ethnicity in the third National Health and Nutrition Examination Survey. *Diabetes Care* 2004;27:2813–8.
29. Baradaran A, Behradmanesh S, Nasri H. Association of body mass index and serum vitamin D level in healthy Iranian adolescents. *Endokrynol Pol* 2012;63:29–33.
30. Khashayar P, Meybodi HR, Soltani A, Taheri E, Homami MR, Heshmat R, et al. Association between vitamin D levels and BMI values in an Iranian population. *Clin Lab* 2014;60:383–9.
31. Lagunova Z, Porojnicu AC, Lindberg F, Hexeberg S, Moan J. The dependency of vitamin D status on body mass index, gender, age and season. *Anticancer Res* 2009;29:3713–20.
32. Palazhy, S., Viswanathan, V. & Muruganathan, A. *Int J Diabetes Dev Ctries* 2017;37: 69.
33. Meo SA, Zia I, Bukhari IA, Arain SA. Type 2 diabetes mellitus in Pakistan: Current prevalence and future forecast. *JPMA* 2016;66(12):1637–42.
34. Fondjo LA, Owiredu WKBA, Sakyi SA, Laing EF, Adotey-Kwofie MA, Antoh EO, et al. (2017) Vitamin D status and its association with insulin resistance among type 2 diabetics: A case control study in Ghana. *PloS One* 12(4): e0175388.
35. Witham MD, Dove FJ, Dryburgh M, Sugden JA, Morris AD, Struthers AD. The effect of different doses of vitamin D3 on markers of vascular health in patients with type 2 diabetes: a randomised controlled trial. *Diabetologia* 2010;53(10):2112–9.